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1950 ACHIEVEMENTS IN SOVIET MACHINE-TOOL BUILDING -- PART II

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[Item numbers in brackets refer to appended graphics material]

The NIBV (Scientific Research Bureau of Interchangeability) has designed a number of original measuring tools, instruments, and automatics.

An automatic for checking pistons [Item 1] is intended for checking the size, for marking, and for sorting finished pistons for internal combustion engines.

The productivity of the automatic is 360 pistons per hour. All measuring is based on a pneumatic method with the use of 19 electropneumatic differential transmitters (datchik). The loading and unloading of pistons is completely automatic.

Rejected pistons are sorted into three containers according to the types of defects. These defects involve, respectively:

1. The perpendicularity of the axis of the hole, the distance from the axis of the hole to the bottom of the piston, and the taper of the skirt.
2. The out-of-roundness, taper, and limits of the hole diameter.
3. The hole diameter and the displacement of the hole in relation to the axis of the piston.

In the automatic for checking the hardness of pistons [Item 2] the loading and unloading of pistons, like the measuring of hardness, is done automatically.

Hardness is determined by applying two successive loads of 60 and 750 kilograms through a steel ball 5 millimeters in diameter. The difference of the indentation is measured by means of an electrocontact transmitter (datchik) and serves as an index of hardness.

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The automatic rejects pistons whose hardness falls outside the established limit of  $H_B$  115 — 150.

The productivity of the automatic is 318 pistons per hour.

A semiautomatic for checking spark plugs and their cores for hermetic sealing and normal spark formation was designed by the NIBV in conformance with GOST 2043-43 requirements. The hermetic sealing of spark plugs (cores) is checked by passing compressed air under a pressure of 10-15 atmospheres through leaks in the spark-plug connections.

Spark formation is checked by means of a photocell which transmits a controlling impulse to another valve unit (zaslonka).

In checking the hermetic sealing of spark plugs, GOST 2043-43 requires that the pressure be maintained for 30 seconds. To increase the productivity of checking and to utilize the time interval better, the semiautomatic is equipped with ten positions to permit manual loading, unloading, and sorting of parts during this interval according to the results of the test.

The productivity of the machine is 900 spark plugs per hour.

A group of automatics for the tool industry have been designed by the NIBV for checking the diameter of drill blanks, external diameter of chasers, and height of chasers.

The automatic for checking drills is intended for drills from one to 12 millimeters in diameter. The drill blank is checked on two cross sections and is classified in one of three groups, "suitable," "rejected plus," and "rejected minus."

The productivity of the automatic is 1,500 drills per hour.

The semiautomatic for checking the diameter of circular chaser blanks checks circular chasers 16, 20, 25, 30, and 38 millimeters in diameter and classifies them into three groups.

The productivity of the semiautomatic is 600 items per hour. Except for loading, all operations are performed automatically.

The automatic for checking circular chaser blanks for height checks chasers of the same diameters from 5 to 14 millimeters high, and classifies them into three groups. The loading is done by hopper and the measuring by electrocontact heads. Its productivity is 1,000 items per hour.

A universal involute gear measuring device (evolventomer) [Item 3] is intended for checking the profile of involute gears with a module of 0.7 to 10 millimeters and pitch circle of up to 300 millimeters. Teeth with an angle of up to 30 degrees can be checked on this machine. The device is equipped with a 2-micron indicator. The range of measurement error is  $\pm 3$  microns.

An instrument for checking the identity of worms and hobs has been developed by the NIBV for checking the running of worms and hobs with a module of one to 20 millimeters and diameter of 30 to 155 millimeters, as well as for checking the pitch and profile. This type of measuring is mandatory in the manufacture of precision worm pairs. The maximum distance between centers in the instrument is 510 millimeters.

Course adjustment for angle of worm profile is done with a scale, whereas fine adjustment is accomplished with a sine bar.

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A new instrument for Model 3263 centerless grinding machine is intended for automatic checking during the grinding process of tapered holes of outer roller bearing rings from 60 to 185 millimeters in diameter.

Depending on the variation in size of the hole being ground, the instrument transmits two electrical impulses to operating mechanisms. The first is to the feeding mechanism, which shifts from rough to finish grinding as soon as the allowance for rough grinding has been removed. (Automatic dressing of the grinding wheel takes place at the same time.) The second impulse is transmitted to the mechanisms which stop the machine tool at the moment that the specified size of the workpiece is reached.

The accuracy of the instrument is  $\pm 3$  microns.

An instrument for Model 345 spline grinding machine is intended for checking the width of splines and internal diameter of spline shafts from 30 to 120 millimeters in diameter and 100 to 500 millimeters long; width of spline that can be checked is from 4 to 20 millimeters; and the number of splines that can be checked is from four to 24.

The width of the spline and internal diameter are measured separately.

The device controls the following operations. First, finish grinding, after removal of the rough grinding allowance, and withdrawal of the grinding wheel for dressing; second, stopping the machine tool after the specified size of the workpiece has been reached.

A circular dividing machine has been designed by the NIEV for automatic and nonautomatic drawing of graduation lines on dials up to 750 millimeters in diameter and up to 160 millimeters high within an accuracy of one second. The productivity of the machine with one-sided sectors is eight lines per minute; with two-sided sectors, 16 lines per minute. The minimum angle between adjacent lines, in automatic operation, is 15 seconds. Smaller divisions can be made by hand with the use of a vernier. The machine is equipped with a counter which is set for the required number of divisions and stops the machine after the last division has been made. The cutter for drawing the divisions can move in four directions: forward, backward, up, and down.

A new pneumatic recorder [Item 4] is intended for recording automatically the results of gear measurements taken on gear measuring instruments. The gear ratio of the measuring instrument's indicator is 1,000 [1]; the gear ratio of drum rotation [of the recorder] is from two to six times that of the table travel of the gear measuring instrument. The limit of accuracy of the measuring instrument is  $\pm 50$  microns. The number of indicator oscillations of the recorder is one to two per second. The movement of the contacting pointer of the gear measuring instrument, magnified 1,000 times, is transmitted to the pen of the recorder; the gear ratio of the aneroid box (sil'fon) is 100:1; of the indicator, 10:1. Deviation of the feeler gauge is transmitted to the pneumatic measuring device and is recorded on charting paper.

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GRAPHICS MATERIAL AVAILABLE

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1. Location: USSR, NIBV (Scientific Research Bureau of Interchangeability)

Caption and Description: "Piston-Checking Automatic"

Photograph Description: Size, 2 x 3 inches; fair; pulp paper

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Stanki 1 Instrument, Moscow, Sep 1951, page 4, column 2

2. Location: USSR, NIBV (Scientific Research Bureau of Interchangeability)

Caption and Description: "Automatic for Checking Hardness of Pistons"

Photograph Description: Size, 2½ x 3½ inches; fair; pulp paper

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Stanki 1 Instrument, Moscow, Sep 1951, page 5, column 1

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3. Location: USSR, NIBV (Scientific Research Bureau of Interchangeability)

Caption and Description: "Universal Involute Gear Measuring Device (Evolvermentomer)"

Photograph Description: Size, 1½ x 3¼ inches; fair; pulp paper

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Stanki 1 Instrument, Moscow, Sep 1951, page 5, column 2

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4. Location: USSR, NIBV (Scientific Research Bureau of Interchangeability)

Caption and Description: "Pneumatic Recorder"

Photograph Description: Size, 1½ x 3½ inches; fair; pulp paper

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Stanki 1 Instrument, Moscow, Sep 1951, page 6, column 1

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